NEWTON

∗ The user needs to guarantee that the function f(X) is continuous on the interval and that the derivative does not equal zero in any of the points of the interval being analyzed

1) Ask the user for the function f(X), the derivate of the function f'(X), and the tolerance.

2) Ask the user for the value X_0 which will be the initial value.

3) Evaluate X_0 in the function to obtain $f(X_0)$. If $f(X_0) = 0$ then the user will be notified that this is the root.

4) Evaluate X_0 in the derivate of the function to obtain $f'(X_0)$

5) Now we find the following value of X, we will store it in the variable X_n ... we find it using the following formula $X_n = X_0 - [f(X_0) / f'(X_0)]$ and we evaluate it in the function f(X)... if $f(X_n) = 0$ then the user will be notified that this is the root.

6) Finding the error. Error $= | X_0 - X_n |$

7) Now we make a cycle.... While the error > tolerance, $f(X_n) \neq 0$, do:

   a) $X_0 = X_n$
   b) $f(X_0) = f(X_n)$
   c) $f'(X_0)$ = the new value of X_0 evaluated in the derivative
   d) $X_n = X_0 - [f(X_0)/f'(X_0)]$ the new value of X_0 in the formula
   e) Error $= | X_0 - X_n |$
   f) $f(X_n)$ = the new value of X_n evaluated in the function f

8) If the error ≤ tolerance, tell the user that the root is approximately X_n (final value) with an error of: ____(with the final value of the error)

9) If $f(X_n) = 0$ tell the user that X_n is the root.